

INTERIOR BLIND SPOT MIRROR

This application claims benefit to US provisional patent application No. 60/505,279 Sept. 23/2003.

TECHNICAL FIELD

The invention relates to an interior blind spot rear view mirror for motor vehicles, and more specifically to a mirroring system having the standard adjustment features that allow a driver of a vehicle to adjust the mirror to such a desired position that the mirror of the present invention can meet the eye level of a driver, and completely eliminate the blind spot. The interior blind spot mirror of the present invention includes a rectangular, or oval-shaped mirror constructed of convex glass or plexiglas, a curving extension which serves as a bridge between the above mentioned mirror and a separate base which has a pad constructed of resilient material such as polymer attached to the bottom of the separate base. Two double stick foam attachment means attached to the above mentioned pad to enable the separate base of the interior blind spot mirror to be fitfully mounted to any type of the window frames of motor vehicles which are defined hereafter as pillar(s) and provide a secure base for the mounting of the interior blind spot mirror of the present invention. Specifically, the present invention is a mirror which can be rectangular or oval-shaped and which includes a round, curved extension attached on the back of the mirror serving as a bridge between the mirror and a separate base. A ball joint is placed on either end of the extension, the function of which is to flexibly and yet substantially secure the blind spot mirror to a chosen position from which it can reflect whatever is within the blind spot. Additionally, the interior blind spot mirror of the present invention

can also be mounted on the passenger's side to further provide a device that can eliminate the blind spot on the passenger's side.

A separate base of the interior blind spot mirror includes a U-shaped mounting box on top into which the extension of the mirror is slidably affixed. Because of a pad of soft attachment on the bottom of the separate base of the present invention, the separate base provides a flexible attachment to all types of pillars, whether it is curving, square or flat, and therefore enables the interior blind corner mirror of the present invention to fit all types of vehicles including cars, vans and trucks.

BACKGROUND INFORMATION

Constant lane-switching, which is inevitable while driving on a busy highway, has been causing greater inconvenience for a driver of a motor vehicle today than five years ago, and it goes without saying that the situation will aggravate in the next five years due to the rapidly increasing number of cars which make the already crowded highway system, especially around metropolitan, or densely populated urban areas become more crowded. As a result, while driving in highway zones like that, a driver has to constantly turn his/her head around to look backward at what is known as the blind spot, a spot neither the interior rearview mirror, nor the exterior side rear-view mirror of a vehicle is able to reflect, to make sure there is not a passing vehicle there before he/she switches to the passing lane.

For the better part of history, automobiles don't have a blind spot mirror to speak of, although accidents caused directly or indirectly due to the failure of noticing the blind spot had concerned the insurance companies, the engineers and designers in the profession for a long period of time, especially since the last quarter of the twentieth

century. In more recent years, a round convex mirror known as fisheye was invented to install on top of the side rearview mirror to serve, by using its unique feature of convexity to widen the capacity of a conventional mirror's reflecting coverage, as the blind spot mirror. And upon the invention of this tiny convex mirror an improvement was made and a larger, round convex mirror was built to install on trucks, usually below the exterior side rearview mirror to serve as a blind spot mirror. Since the improved convex mirror was larger than "the fisheye", its capacity of reflecting coverage was greater than its predecessor's. And a relatively smaller round convex mirror was consequently made to attach on top of the exterior side rearview mirror by means of double stick foam adhesive to serve as the blind mirror for smaller vehicles such as family cars, vans, jeeps etc.

Literally, many prior art patents exist in this area of technology which, in theory, should substantially eliminate the blind spot. In reality, however, none of them is able to convince a driver that the blind spot has been completely eliminated, on the contrary, due to the position of the exterior rearview mirror upon which the convex blind mirror was attached, the round convex blind spot mirror, while reflecting images inside the blind spot mirror, will also reflect images which are not in the blind spot. As a result a driver has to discern which one of these images is inside the blind spot and which is not. Moreover, only those bigger vehicles such as trucks and buses have enough room for the installation of a full-sized convex mirror without sacrificing the area of the side rearview mirror, as the exterior convex blind spot mirror can only be installed outside the vehicle, a family vehicle has to sacrifice at least one third of the area of its side rearview mirrors in order to put on an exterior blind spot mirror.

These deficiencies of the exterior blind spot mirror limited its application, while on the other hand the request of the blind spot mirror for automobiles, especially family vehicles whose numbers are increased rapidly in recent years become more urgent. And it is commonly acknowledged that the lacking of a blind spot mirror is one of the most dangerous factors that may cause terrible accidents on highways.

Clearly, the invention of the exterior convex blind spot mirror is the advancement in the area of safety to the drivers under heavy traffic circumstances, yet this advancement is only applicable to bigger vehicles such as trucks, buses which have enough room below the side rearview mirror for the installation of the exterior convex blind spot mirror. That is, an exterior convex blind spot mirror is only effective when it is used properly for bigger vehicles, although, of course, due to the limitation of its position, the exterior convex blind spot mirror doesn't provide for a driver of a bigger vehicle with a complete view when a small vehicle passes by.

Since such an advancement is not properly done, a small-sized vehicle such as a family car, a van, or a pick-up etc. still suffers the inconvenience caused by the blind spots.

A number of blind spot mirrors have been developed which attempt to properly eliminate the blind spots. Examples of this prior art of blind spot mirrors include US Pat. No. 4,182,552 discloses a composite mirror assembly adapted to be mounted adjacent the driver of a vehicle to enable the driver to view objects within an area normally hidden from view by conventional vehicle mirrors. An additional mirror is positioned at an angle with respect to the conventional side mirror.

US Pat. No. 4,200,359 discloses a small, flat mirror being mounted through use of a wedge-shaped adhesive block to the inside portion of a conventional side view mirror. The block positions the small mirror at an angle of about 15 degrees to 20 degrees with respect to the plane of the side view mirror to thereby eliminate the blind spot.

US Pat. No. 5,044,739 discloses a smaller auxiliary convex mirror mounted on a larger mirror so that the smaller auxiliary convex mirror may be tilted to a limited extent to more precisely position the wide angle field of view it provides. The convex mirror is attached to a tilting plate by an adhesive means, and the tilting plate has a central projecting member with a cavity. A support plate attached to the smooth base mirror by another adhesive means has a corresponding central bar with a spherical head which engaged in the cavity of the tilting plate so that the convex mirror and tilting plate are pivotable.

US Pat. No. 5,566,028 discloses an apparatus, which exposes the blind spot in the direction in which a vehicle makes a turn, to be installed at the back of mechanically or electrically operated side rearview mirrors. A mechanical device, connected to a mirror unit and to the frame, having a diaphragm sealingly disposed therein. When a winker switch is activated, the diaphragm housing is activated by vacuum, causing the diaphragm to be sucked backwards, resulting in said mirror unit pivoting backwards to expose the blind spot . . .

US Pat. No. 6,076,934 discloses a vehicle blind spot mirror with a mirror having a single plane outwardly curved surface, and extension member attached to the rear portion of the outwardly curved mirror and having a double stick foam tape attachment means on the opposite surface of the extension, allowing the extension and attached blind spot

mirror to be affixed to a vehicle's existing rearview mirror even if the rear view mirror is set in a recessed frame, thereby allowing for a larger blind spot mirror than the original rearview mirror.

US Pat No. 6,523,965 discloses an improved mirror for use on most types of motor vehicles (cars and trucks) includes two flat reflecting surface used as the principal rearview mirror, and a second reflecting surface being oriented so as to provide a reflected image of traffic in the blind spot mirror. A support structure holds the principal reflecting surface bound to the larger reflecting surface, the blind spot mirror. Although the blind spot mirror is larger, only portions of it appear to the driver as it is mostly covered by the principal reflecting surface. The support structure between the two reflective surfaces has the shape of a wedge necessary for maintaining the blind spot mirror at the proper angle so as to reflect blind spot traffic to the eye of the driver.

Although these prior art blind spot mirror units are adequate for the purpose for which they were intended, these devices either fail to completely eliminate the blind spot or cast the intactness of the side rearview mirror by taking a considerable portion of the side rearview mirror for the attachment of the blind spot mirror. The conventional side rearview mirror of the driver's side, which is just big enough for a driver of a vehicle to view objects within that angle, will become rather ineffective even if a quarter of it is taken for the installation of the blind spot mirror, leave alone the possibility of visionary confusion, such as broken, fragmental images in both mirrors, that the combination of the two mirrors will cause.

Therefore, the prior art blind spot units are only suitable for a bigger vehicle such as a truck, a school bus that has enough rooms below the side rearview mirrors on either

side of the driver for the installation of the blind spot mirror units. It would obviously be preferable to provide a more effective, flexible device for smaller vehicles to eliminate the blind spot without sacrificing the conventional side rearview mirrors.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an interior blind spot mirror capable of covering the dead angle and completely eliminating the blind spot.

It is another object of one or more embodiments of the present invention to provide an interior blind spot mirror that can be flexibly mounted on the window frame so that it fits all types of motor vehicles, especially for family cars, vans, and trucks as well.

It is another object of the present invention to provide an interior blind spot mirror which, after being mounted on the window frame, can be adjusted to fit drivers of different height.

It is another object of the present invention to provide a separate base for the interior blind spot mirror that can fit all types of pillars of the cars windows.

It is another object of the present invention to provide an interior blind spot mirror to be flexibly taken off and mounted on the separate base.

It is another object of the present invention to provide an interior blind spot mirror that comprises a separate base so that a user of the present invention can mount the base which has a double foam stick attachment means on its bottom onto a pillar and allow the adhesive to reach its ultimate strength before mounting the blind spot mirror on the separate base.

It is another object of the present invention to provide an interior blind spot mirror that comprises a U-shaped mounting box on top of the separate base so as to enable the extension of the interior blind spot mirror to be slidably affixed to the separate base.

It is another object of the present invention to provide an interior blind spot mirror having a base constructed of soft resilient material that enables the base to fit various types of pillars of the window frames of vehicles.

It is another object of the present invention to provide an interior blind spot mirror that is cost efficient to install in a vehicle, making the vehicle safer.

It is another object of the present invention to provide an interior blind spot mirror to the passenger's side to eliminate the blind spot on the right side of the vehicle.

It is a further object of the present invention to provide an interior blind spot mirror which is of simple construction, which achieves the stated objects in a simple, effective and inexpensive manner, and which solves problems and satisfies needs existing in the art.

These and other objects and advantages are obtained by the interior blind spot mirror of the present invention, the general nature of which may be stated as including a mirror (rectangular or oval) having an extension, two ball joints, a U-shaped mounting box and a separate base which is removably attached to the interior side window frame of a vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiments of the invention, illustrative of the best mode in which The inventor has contemplated applying the principles, are set forth in the following

description and are shown in the drawings and are particularly and distinctly pointed out and set forth in the appended claims.

FIG. 1 is a front view of the interior blind spot mirror of the present invention showing the mirror properly positioned to show a passing car in what is defined as the blind spot on the driver's side.

FIG. 2 is a rear view of the interior blind spot mirror of the present invention showing the mirror, the first ball joint between the mirror and the extension, the extension, the second ball joint between the extension, the joint box, and the separate base.

FIG. 3, including A and B, are two section views of the ball joints and the structural detail of the interior blind spot mirror, the extension and the joint box.

FIG. 4 includes three side elevations of the separate base when they are mounted on three geomorphically different surfaces, the curving, the square and the flat.

FIG. 5 is a top view of a car with two interior blind spot mirrors mounted on both pillars of the window frames inside the vehicle.

FIG. 6 is a sectional perspective of the second ball joint showing the relationship between the extension, the ball joint, the joint box, the separate base, the soft pad and the double side foam attachment.

FIG. 7 is a front elevation of an oval-shaped mirror which has a soft base that can fit pillars of different contours.

FIG. 8 A shows the wedging connection between the soft base and the U-shaped mounting box.

FIG. 8 B is a section of the soft base when it is connected with the mounting box and the extension of the interior blind spot mirror on the top.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Accordingly, the interior blind spot mirror of the present invention is shown in **FIG. 1, 2** and is indicated at **10** which generally includes a rectangular or oval-shaped mirror **20**, an extension **21** seen in **FIG. 2, 3, 4, 6** and **7**, and a separate base **23** seen in **FIG. 2**. Having the capacity of reflecting whatever is hidden in the blind spot, the interior blind spot mirror of the present invention provides for a driver with such a device that prevents him/her from turning around to look backward to check if there is a passing vehicle hidden inside the blind spot while driving.

Although base **32** of the interior blind spot mirror of the present invention shown in **FIG. 4** can be installed on different shaped window frames of vehicles by means of applying a pad of soft resilient material sandwiched between said separate base **32**, and double stick foam attachment means **34** as seen in **FIG. 4**, the interior blind spot mirror of the present invention can also be mounted on all types of pillars by applying a soft base which is constructed of polymer or other soft materials as seen in **FIG. 7**.

FIG. 1 illustrates that, when properly positioned, the interior blind spot mirror of the present invention is able to reflect a passing vehicle inside the blind spot. The interior blind spot mirror **10** is mounted on pillar **15** of a vehicle and forms 7-10 degrees with the exterior side rearview mirror **12**, in which position the interior blind spot mirror of the present invention can completely eliminate the blind spot.

Along with other parts, **FIG. 2** illustrates that the interior blind spot mirror of the present invention has two ball-joints **25** and **28** at either end of extension **21** which has a

curving upper part. Having mounted the interior blind spot mirror of the present invention on the pillar of the window frame 15, as is seen in **FIG.1**, a driver of a vehicle can easily position said interior blind spot mirror 10 in a generally parallel relationship with exterior rearview mirror 12 by adjusting the two ball joints of which one controls extension 21, the other, mirror 20. After this is done, a driver can further adjust mirror 20 in the same manner until said mirror reflects the window on his/her left side. If he/she can see in the mirror the major part of the window on his/her left side, the blind spot on that side is eliminated. With the same method said interior blind spot mirror 10 can be mounted on pillar 16 as seen in **FIG.5** and the blind spot on the passenger's side can be completely eliminated, too. Each of said two ball joints includes a base board that is fixed in a tightly frictional manner with said ball by two screws as seen in **FIG. 3 A** and **B**. **FIG. 3 A** shows the top rod of ball 28 being inserted into the lower end of extension 21 while the bottom of ball 28 fits into a concave defined as ball pit 60 on base board 55 which has two holes on either side of said ball pit to hold screws 45 and 46. Said ball 28 and said base board 55 are confined in box 22, and said two bolts 45 and 46 control the tautness of the friction between said ball 28 and said base board 55. The purpose here is to make extension 21 be adjustable in all directions and yet be affixed in any position. **FIG. 3 B** indicates that the top rod of ball 25 being inserted into the upper end of extension 21 and the bottom of ball 25 fits into ball pit 61 on base board 56, and two bolts 43 and 44 control the tautness of the friction between said ball 25 and said base board 56 which is located inside back cover 24 of mirror 20. The purpose here is to make said mirror 20 be adjustable in all directions.

FIG. 4 A, B and C are three embodiments of the separate base of the interior blind spot mirror of the present invention applied on three typically different shaped pillars of the window frames of the vehicles. Between separate base **32** and double stick foam attachment **34** is a pad of soft resilient material such as polymer that enables separate base **32** to fit different shaped pillars. Said separate base **32** includes a U-shaped mounting box **23** on the top so that the bottom of joint box **22** can be slidably fit into said mounting box **23** and said interior blind spot mirror of the present invention is in position. In use, a driver should mount separate base **32** onto pillar **15** and then, in order to let the adhesive material reach its ultimate strength, waits for a couple of hours (or longer) before mounting said mirror **20** on it.

To mount the interior blind spot mirror of the present invention on the pillar on the driver's side of a vehicle, a user should first measure the interior blind spot mirror of the present invention on the pillar of the window on his/her left side with the top of said mirror **20** about two inches higher than the top of said side rearview mirror **12**. When that is done, a user may take said separate base **32** off said joint box **22** on the bottom of said extension **21**, and then peel off the tape on the double stick foam adhesive; and then press said separate base **32** on the spot chosen for the mounting of the interior blind spot mirror of the present invention. Having fixed said separate base **32** on pillar **15**, a user should wait for at least two hours to let the adhesive reach its ultimate strength before inserting said extension **21** of the present invention into said mounting box **22**.

When the interior blind spot mirror of the present invention is properly mounted on pillar **15**, a user can adjust mirror **20** by turning both extension **21** and mirror **20** until the blind spot completely disappears. The blind spot mirror of the present invention can also

be mounted on pillar **16** of a vehicle on the passenger's side, as a result of which the blind spot on the passenger's side can be eliminated, too.

The main structures of the present invention, such as said separate base **32**, said extension **21**, said mirror frame **24**, said ball joint **27** and **28** are constructed of ABS plastic while said bolts **43**, **44**, **45**, **46** are constructed of alloy or stainless steel; said mirror **20** is constructed of antiglare, shatterproof glass or plexiglas and is made convex. Said pad **33** is constructed of resilient material such as polymer to enable said base **32** to fit different shaped pillars as is shown in **FIG. 4**; and said double stick foam adhesive **34** is a kind of adhesive for plastic, leather and synthetic materials.

FIG. 8 shows the embodiment of soft separate base **80**, an alternative of separate base **32**, featuring with central piece **81**, a protuberant, rectangular piece with wedged-in edges, of which the purpose is to enable U-shaped mounting box **70**, which also has wedged-in sides, to be fixed on said base **80**. Being constructed of soft material such as polymer, said soft separate base **80** can fit all geomorphic surfaces more properly than said separate base **32**, and looks better than said separate base **32** because the former is thin and of one piece while the later has a pad that is at least as thick as four millimeter.

What is claimed is:

1. A interior blind spot mirror comprising:

a rectangular, or an oval-shaped mirror constructed of shatterproof mirror glass or plexiglas and is finished with antiglare coating; said rectangular, or oval-shaped mirror can be convex, or conventional;

a plastic mount with a curving back to said mirror;